

3. WASTE ACCEPTANCE AND TRANSPORTATION

3.1 WASTE ACCEPTANCE AND TRANSPORTATION SERVICES

DOE will rely on the private sector to provide the necessary services and equipment required to accept and transport commercial spent fuel to the repository. These services and equipment will be procured by awarding one or more contracts, with each contract covering Purchasers' sites in certain designated regions in the contiguous United States (Purchasers are those owners of commercial spent fuel who have entered into contracts with DOE for disposal of their spent fuel). Each CRWMS regional servicing contractor (hereafter referred to as RSC) will be responsible for all activities and services in its region, including the provision of transportation cask/canister systems and ancillary equipment, as required, to accept commercial spent fuel and transport it to the repository for disposal. Specific performance requirements for each RSC will be set forth in detail in the procurement documents.

To the extent practicable, DOE will also rely on the private sector to provide the necessary services and equipment to accept and transport high-level waste and DOE spent fuel (except Naval spent fuel) to the repository. The Navy will provide transportation of their spent fuel to the repository.

Transportation will be carried out using commercially available equipment and approved routes in compliance with Nuclear Regulatory Commission and Department of Transportation regulations. RSCs would also be responsible for all required intermodal transport between Purchaser sites and the repository.

3.2 CASK/CANISTER SYSTEMS FOR SPENT NUCLEAR FUEL

Cask/canister systems to be used for transportation and storage will not be specified by DOE. They will be developed by industry, certified by the Nuclear Regulatory Commission, and deployed to meet the waste delivery schedules. Interface requirements have been developed by DOE and reside in requirements documents to ensure that the casks and canisters can be received, handled, and utilized at CRWMS facilities. Interface Control Documents are being developed to document how the interface requirements are being satisfied and will provide for the controlled development of the interfaces.

Cask/canister systems differ in whether they employ casks or canisters; whether their functions include transportation, storage, and/or disposal; and how they are transported. In canister systems, spent fuel is sealed inside a canister and the sealed canister is placed into an overpack for transportation, storage, or disposal. The use of canisters may reduce the number of times individual fuel assemblies have to be handled during transport, storage and disposal. Casks/canisters designed and certified for a single use only, such as for transportation or storage, are known as single purpose systems. Casks/canisters designed and certified for both storage and transportation are referred to as dual purpose canisters or transportable storage casks. Canisters designed and certified for transportation, storage, and disposal are known as multi-purpose canisters (MPCs).

The mix of cask/canisters to be deployed in the CRWMS is unknown at this time. It will depend on the availability of technologies that are certified by the Nuclear Regulatory Commission prior to the start of CRWMS operations, and the needs of the individual Purchasers. Some of the cask/canister systems that have been used in the past or may be available in the future for storage and transportation of spent fuel are shown in Tables 5, and 6. Table 7 shows the types of dry storage systems that are currently available for spent fuel. Additional details may be found in two separate publications (JAI Corporation, 1996; INMM, 1997).

Table 5. Rail Cask and Canister Systems

	NAC STC	NAC-MPC	UNIVERSAL MPC SYSTEM (UMS)^b	Holtec HI-STAR 100	Sierra TranStor
Category	Transportable Storage Cask	Dual Purpose Canister	Dual Purpose Canister	Dual Purpose Canister	Dual Purpose Canister
Status	Certified for storage and transport NRC Docket No. 71-9235 72-1002	Storage and transport designs docketed NRC Docket No. 71-9235 72-1025	Storage and transport designs docketed NRC Docket No. 71-9270 72-1015	Storage and transport designs docketed NRC Docket No. 71-9261 72-1008	Storage and transport designs docketed NRC Docket No. 71-9268 72-17
PWR Capacity ^a - no burnup credit	26	37	24	24 or 32 (with burnup credit)	24
BWR Capacity - no burnup credit	not applicable	89	56	68	61
Max. Hook Weight, metric tons (tons)	113 (125)	113 (125)	113 (125)	110 (120)	<91 (100)

Table 5. Rail Cask and Canister Canister Systems (Continued)

	Vectra^c NUHOMS MP-187	Westinghouse WESFLEX System	GE IF-300
Category	Dual Purpose Canister	Dual Purpose Canister	Metal Transport Cask
Status	Certified for storage and transport NRC Docket No. 71-9255 72-11	Storage design docketed NRC Docket No. 92-1026	Certified for transport but cannot be replicated; 2-4 available.
PWR Capacity - no burnup credit	24	21 and 24	7
BWR Capacity - no burnup credit	not applicable	44 and 52	18 without fuel channels; 17 with channels
Max. Hook Weight, metric tons (tons)	110 (122)	113 (125)	64 (70)

^aPWR and BWR capacities in this table and subsequent tables are in terms of number of fuel assemblies

^bInternational consortium effort managed by NAC

^cNow owned by Transnuclear West

Table 6. Truck Casks

	NAC LWT	NL Industries NLI ½	Trans-nuclear TN-8L	Trans-nuclear TN-9	GA-4/9 Casks	
					GA-4	GA-9
Category	Uncanistered SNF Legal Weight Cask	Uncanistered SNF Legal Weight Cask	Uncanistered SNF Overweight Casks		Uncanistered SNF Legal Weight Casks	
Status	Certified, can be replicated ; 5 available	Certified, cannot be replicated; 5 available	Certified, cannot be replicated; 2 available	Certified, cannot be replicated; 2 available	Design in NRC review	
PWR Capacity - no burnup credit	1	1	3	not applicable	4	not applicable
BWR Capacity - no burnup credit	2	2	not applicable	7	not applicable	9
Max. Hook Weight, metric tons (tons)	23 (25)	23 (25)	36 (40)	36 (40)	24 (27)	24 (27)

Table 7. Dry Storage Technologies Being Used or Available for Use at Independent Spent Fuel Storage Installations

Technology	Description	Vendor	Capacity
CASTOR V/21	Metal Storage Cask	General Nuclear Systems, Inc	21 PWR
CASTOR X/33	Metal Storage Cask	General Nuclear Systems, Inc	33 PWR
CASTOR X/74	Metal Storage Cask	General Nuclear Systems, Inc	74 BWR
MC-10	Metal Storage Cask	Westinghouse	49 BWR/ 24 PWR
MVDS	Modular Vault Dry Storage	Foster Wheeler Environmental Corporation	Varies
NAC-128 S/T	Metal Storage/ Transport Cask	NAC International	28 PWR
TN-32	Metal Storage Cask	Transnuclear, Inc	32 PWR
TN-40	Metal Storage Cask	Transnuclear, Inc	40 PWR
NUHOMS-7P	Concrete Storage Module	Vectra Technologies, Inc	7 PWR
NUHOMS-24P	Concrete Storage Module	Vectra Technologies, Inc	24 PWR
NUHOMS-52B	Concrete Storage Module	Vectra Technologies, Inc	52 BWR
VSC-24	Concrete Storage Cask	Sierra Nuclear Corporation	61 BWR/ 24 PWR

3.3 WASTE ACCEPTANCE AND TRANSPORTATION CONCEPT OF OPERATIONS

Prior to the start of any shipping campaign DOE is responsible, under Section 180(c) of the Nuclear Waste Policy Amendments Act, for providing technical assistance and funds to States for training public safety officials of appropriate units of local government and Indian tribes through whose jurisdiction the Department plans to transport spent fuel or high-level waste. The training shall cover procedures required for safe routine transportation of the nuclear materials, as well as procedures for dealing with emergency response situations.

The RSC delivers approved transportation cask/canister systems and ancillary equipment, as appropriate, to each Purchaser in accordance with an established schedule and rate. Casks/canisters used for transportation of spent fuel are to be certified by the Nuclear Regulatory Commission under 10 CFR Part 71, *Packaging and Transportation of Radioactive Material*. As necessary, training in the use of the equipment is provided by the RSC to personnel at the Purchaser site and the repository.

The Purchaser site personnel perform loading operations using equipment and procedures approved by the Nuclear Regulatory Commission. During loading, verification activities are conducted by the Purchaser, which include confirming the identity of each fuel assembly placed into a transportation cask or canister. If a canister is used, it is placed into an appropriate transportation cask or overpack. After loading, the transportation casks are prepared for shipment from the site. The loaded casks are placed on transport carriages, secured, surveyed for contamination, and moved to a protected area to await shipment.

No less than 60 days prior to the scheduled delivery date, the Purchaser provides to the RSC and DOE a detailed description of the spent fuel to be delivered. This description specifies the calculated burnup of the fuel assemblies, identifies any non-standard assemblies, and provides other detailed physical characteristics of the assemblies. This information is required pursuant to 10 CFR Part 961, *Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste*.

Prior to beginning waste acceptance and transportation operations at a Purchaser site, the RSC interfaces with repository personnel to ensure that shipments from this site are coordinated with shipments from other sites. Data for each shipment are assembled, including a detailed schedule, a detailed route plan, points of contact, safe parking and routine route stop information, incident response information, and any required permits. During the course of the shipment, additional information is accumulated, including incident reports, driver's log, and any other appropriate information.

The RSC prepares for transportation operations by arranging for all necessary services and equipment required to safely and efficiently ship the spent fuel from the Purchaser site to the repository. This may include appropriate carrier services, on-site/near-site intermodal transfer services, advanced notifications to appropriate jurisdictions, in-transit security and communications, and payment of any State-imposed tolls and fees.

Prior to departure from the site, the cask and its transport carriage undergo final checks and inspections by the RSC. This includes verifying the transportation cask identification number and integrity of tamper-indicating devices. The RSC's carrier and in-transit security personnel are briefed in accordance with established procedures. A final survey is made to ensure that the cask meets contamination and dose rate limits.

After the cask and transport carriage pass their final checks and inspections, Purchaser site personnel turn over to the RSC documented verification that the cask was properly loaded, marked, and labeled. Title transfer and physical possession of the spent fuel from the Purchaser is completed with the RSC accepting the spent fuel on behalf of DOE.

Loaded transportation casks are moved off the Purchaser site by legal weight truck, rail, heavy haul truck, or barge. Rail casks travel as general freight or by dedicated train. Rail casks departing the Purchaser site by heavy haul truck are taken to an intermodal transfer point where they are transferred to a rail car. Rail casks departing the Purchaser site by barge are moved to port or barge

slip where they are transferred to a rail car.

Regardless of the mode of transportation, all shipments are made by the RSC from the Purchaser site via a predetermined route approved by the Nuclear Regulatory Commission. The RSC provides for in-transit tracking and in-transit physical security in accordance with 10 CFR Part 73, *Physical Protection of Plants and Materials*. In the event of an in-transit incident, the RSC notifies the Nuclear Regulatory Commission, Department of Transportation, DOE, and State, Tribal, and/or local officials, and provides technical assistance, if requested, to the officials in charge at the scene.

Loaded transportation casks are delivered by the RSC to the repository. At the repository, the RSC transfers all documentation accompanying each transportation cask to the repository operator. The RSC prepares empty transportation casks for shipment back to Purchaser sites.

Deliveries are continued until the completion of the RSC's service contract. At the completion of the service contract, the RSC retains ownership of equipment and materials that are no longer required, and is responsible for their disposition. Reusable equipment such as casks, rail cars, and ancillary equipment are the property of DOE and will be provided to the next RSC.

While currently not yet formulated, the acceptance and transportation of DOE wastes (except Naval spent fuel) are expected to follow a similar concept of operations.